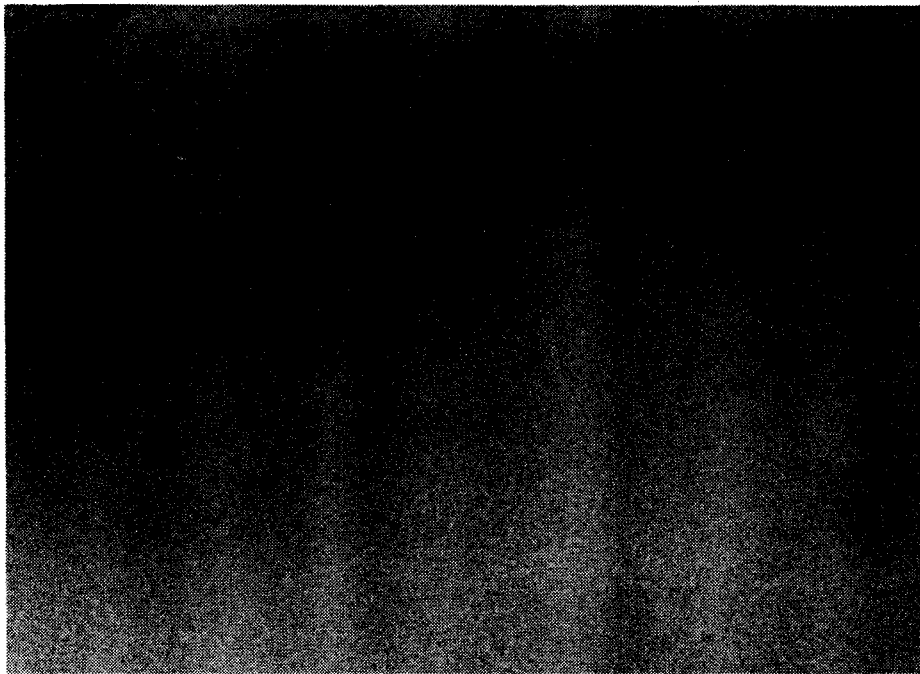


# FISHERY RESEARCH



**FEDERAL AID  
IN  
FISH RESTORATION**

**FISH HATCHERY EVALUATIONS-IDAHO**  
Performed for United States Department of the Interior  
Fish and Wildlife Service, Contract No. 14-16-0001-87501  
Lower Snake River Fish and Wildlife Compensation Plan



By

**Robert L. Rohrer**  
Senior Fishery Research Biologist

**April 1988**

## TABLE OF CONTENTS

	<u>Page</u>
ABSTRACT .....	1
INTRODUCTION .....	2
OBJECTIVES .....	2
RECOMMENDATIONS .....	4
METHODS .....	4
Hatchery Oversight and Documentation .....	4
Research and Evaluation .....	5
Adult Steelhead Redd Counts and Trapping .....	5
Juvenile Salmonid Densities .....	5
RESULTS and DISCUSSION .....	5
Hatchery Oversight and Documentation .....	5
McCall Hatchery .....	5
Dworshak National Fish Hatchery .....	8
Hagerman National Fish Hatchery .....	8
Sawtooth Hatchery .....	8
Research and Evaluation .....	16
Adult Steelhead Redd Counts and Trapping .....	16
Juvenile Salmonid Densities .....	17
ACKNOWLEDGEMENTS .....	20
LITERATURE CITED .....	21
APPENDICES .....	22

## LIST OF TABLES

Table 1.	Release data for McCall Hatchery-reared summer chinook salmon (brood year 1985), 1987 .....	6
Table 2.	Coded wire tag returns for marked groups of summer chinook salmon returning to the South Fork Salmon River, 1986 .....	7
Table 3.	Release data for Dworshak National Fish Hatchery-reared spring chinook salmon (brood year 1985), 1987.	9
Table 4.	Returns for spring chinook salmon reared at Dworshak National Fish Hatchery, 1986 .....	9

## LIST OF TABLES (Continued)

	<u>Page</u>
Table 5. Release data for Hagerman National Fish Hatchery-reared steelhead trout, 1986-1987 .....	10
Table 6. Release data for Sawtooth Hatchery-reared chinook salmon smolts, 1986-1987 .....	11
Table 7. Adult return summary for anadromous fish released at Sawtooth Hatchery, 1986-1987 .....	12
Table 8. Summary of coded wire tag returns for East Fork Salmon River trap and Little Salmon River at Hazard Creek releases .....	13
Table 9. Summary of coded wire tags returns for Sawtooth Hatchery and East Fork trap area releases . . . .	14
Table 10. Summary of "size at release" test groups released from Hagerman National Fish Hatchery, 1984-1985. . .	15
Table 11. Juvenile salmonid density by snorkeling (number/100 m <sup>2</sup> ) data for Slate Creek, 1985-1986 .....	18
Table 12. Juvenile salmonid density data by snorkeling (number/100 m <sup>2</sup> ) for White Bird Creek, 1985-1986 .	19

## LIST OF FIGURES

Figure 1. Location of Lower Snake River Compensation Plan facilities in Idaho .....	3
---	---

## APPENDICES

Appendix A. Trapping summary of adult summer chinook salmon on the South Fork Salmon River .....	23
Appendix B. Trapping summary of spring chinook salmon on the Clearwater River at Dworshak National Fish Hatchery	24
Appendix C. Trapping summary of spring chinook salmon on the Salmon River at Sawtooth Hatchery .....	25
Appendix D. Proposed production and distribution summary of Idaho's LSRCP anadromous fish hatcheries' smolt production .....	26

## ABSTRACT

Construction work was completed on Magic Valley Steelhead Hatchery in 1987, and work will begin on the proposed Clearwater Hatchery in 1989.

A total of 958,300 brood year 1985 summer chinook salmon smolts from McCall Hatchery were released into the South Fork of the Salmon River in the spring of 1987. Dworshak National Fish Hatchery released 1,710,710 spring chinook salmon in 1987. Outplants of steelhead smolts from Hagerman National Fish Hatchery totaled 1,535,351 in 1987. In addition, 168,832 excess steelhead presmolts were outplanted. In 1987, 1,081,400 spring chinook salmon smolts were released at Sawtooth Hatchery, and a total 195,000 chinook salmon smolts were planted at the East Fork trap. An additional 1,317,750 chinook salmon reared at Sawtooth Hatchery were released in the Clearwater River basin in 1986-1987.

Adult steelhead returns to Sawtooth Hatchery numbered 2,187 in 1987; 979 fish were released above the trap. Total returns to the East Fork trap were 224 steelhead.

To monitor anadromous parr density, nine snorkel transects were completed in 1986 on Slate Creek and White Bird Creek. Whitebird Creek had higher rainbow-steelhead summer parr density counts. Snorkel transects proved more effective over a wider range of conditions than electrofishing in counting parr.

Author:

Robert L. Rohrer  
Senior Fishery Research Biologist

## INTRODUCTION

The United States Congress authorized the Lower Snake River Fish and Wildlife Compensation Plan (LSRCP) in 1976 to mitigate for fish and wildlife losses as a result of Lower Snake River dams. The LSRCP requires that anadromous fish runs be returned to preproject numbers primarily with the aid of fish hatcheries. To date, five LSRCP hatcheries are in operation within Idaho: McCall Hatchery, Dworshak National Fish Hatchery (DNFH), Hagerman National Fish Hatchery (HNFH), Sawtooth Hatchery, and Magic Valley Steelhead Hatchery (Figure 1). Work could begin on the proposed Clearwater Hatchery in 1989.

This project will provide a documentation of the hatchery rearing programs including: broodstock selection, size of fish reared, time and size at release, on-site research programs, and oversight of all operations. This report summarizes releases and returns for 1986-1987 (from July 1, 1986 through June 30, 1987) LSRCP hatchery programs.

The McCall Hatchery was the first LSRCP facility completed. Rearing capacity for McCall Hatchery is 1,000,000 summer chinook smolts at 15-20 per pound at release. The McCall Hatchery has been in full production since 1986. Hatchery stocking data on release groups are entered each year on computer for later reference at time of return.

In 1981, the LSRCP authorized and funded an additional 30 raceways to rear 1,000,000 spring chinook smolts (15-20 per pound) at Dworshak National Fish Hatchery. In addition, in 1986-1987, 16 additional raceways were used to rear chinook. These raceways had previously been used for the resident trout program. The first chinook releases under LSRCP from DNFH were in 1983.

Hagerman National Fish Hatchery is owned and operated by the U.S. Fish and Wildlife Service. Under LSRCP the hatchery was rebuilt to rear about 340,000 pounds of steelhead at between 4-5 per pound (1,700,000).

Sawtooth Hatchery became fully operational in 1985. Capacity is about 2,200,000 spring chinook (approximately 25 per pound).

## OBJECTIVES

1. Hatchery records will be compiled and summarized of numbers and size of fish planted at each off-site location. These off-site areas will be prioritized as to suitability for a particular species and size at time of release.
2. Records will be compiled and summarized as to numbers of fish produced at each LSRCP facility; categorized by strain, size, weight; and stocking of transfer location. Fish condition and survival rates to stocking will also be noted.

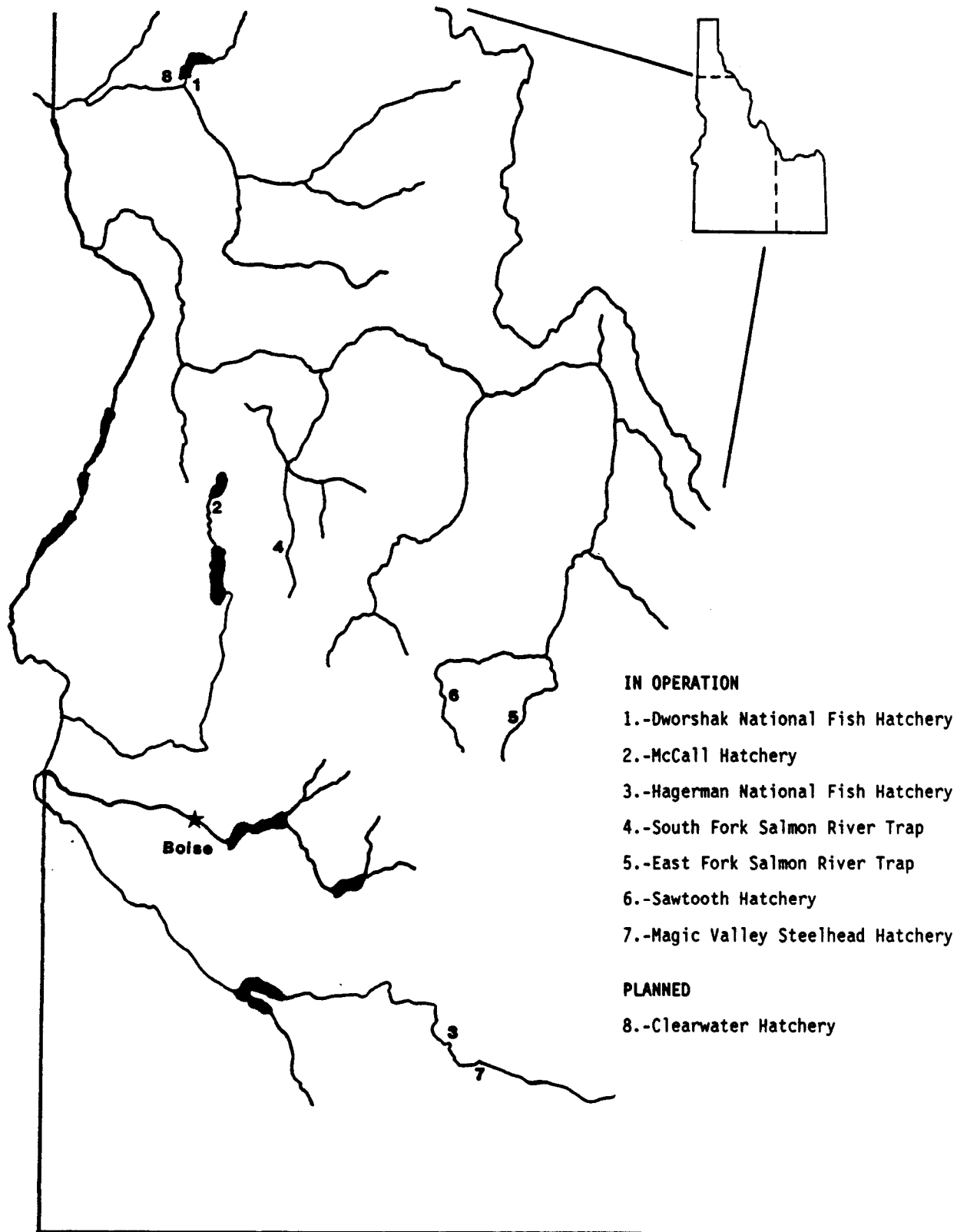


Figure 1. Location of Lower Snake River Compensation Plan facilities in Idaho.

3. Survival of downstream migrants to lower river sampling points will be documented for each production program insofar as data may be supplied by other downstream monitoring efforts.
4. Evaluation of off-site releases will be monitored by enumerating returning adults by weirs or redd counts and identifying juvenile densities and relative abundance of downstream migrants.

#### **RECOMMENDATIONS**

1. Evaluate the rearing of 3 per pound A-group steelhead at Hagerman National Fish Hatchery for release in the Salmon River at Sawtooth Hatchery.
2. Do not plant B-group steelhead in White Bird Creek until the status of the wild run is determined.
3. Do not use Allison Creek as an outplant site for steelhead. If a site in the vicinity is needed for "staging" returning adults, use Lake Creek or French Creek.
4. Redistribute (as fish are available) stocking of some of the 1,000,000 A-run steelhead smolts scheduled in Little Salmon River at Hazard Creek to other tributaries, including French Creek, Lake Creek and others (i.e., Hazard Creek 400,000, French Creek 200,000, Lake Creek 100,000, and Rice Creek 300,000).
5. Proceed with stocking (when fish are available) of spring chinook (100,000) in Slate Creek, as given in the Idaho Anadromous Fisheries Management Plan. Future harvest should occur in Slate Creek to avoid harvest of wild chinook destined for the Middle Fork Salmon River.

#### **METHODS**

##### **Hatchery Oversight and Documentation**

Oversight of hatchery operations was a major project goal in 1987. Hatchery facilities are fully described by Partridge (1984) and Rohrer and Partridge (1985). Much of the information in this report was provided by the hatchery superintendents. Kent Ball provided harvest estimates of LSRCP coded wire-tagged fish. Release site return data was provided by Tim Cochnauer; no returns of CWTs were obtained from downstream (Columbia River or Lower Snake River) agencies. In addition, several trips to LSRCP facilities were made in 1986-1987, and regular coordination meetings are held each year. To determine the number of returning spawning adults, we made redd counts as time allowed in 1987.

## **Research and Evaluation**

### **Adult Steelhead Redd Counts and Trapping**

Two streams, Slate Creek and Allison Creek, were sites of B-run steelhead smolt plants in 1983 and 1984 from stock reared at DNFH. Detection of returning adults was made by observing selected areas during spawning periods in the spring of 1987. Dates and times of observations were recorded. Numbers and locations of steelhead redds were also recorded. A temporary weir was installed in 1987 on Slate Creek to monitor returning adults to determine run composition and timing. Welsh et al. (1965) provided habitat data for White Bird and Slate creeks.

### **Juvenile Salmonid Densities**

Snorkel transects established on Slate Creek and White Bird Creek were sampled as in 1985 (Rohrer and Davis 1986). In addition, another transect was set up on White Bird Creek. Evaluating summer parr density of anadromous salmonids has been used to monitor increase in juvenile production by naturally produced fish (Petrosky and Holubetz 1985).

Estimates of juvenile rainbow-steelhead trout densities were obtained from selected transect sites by the use of and snorkeling electrofishing. A blocking net was placed at each end of the transect. After obtaining a count of fish by snorkeling, we electrofished and used the three-pass removal method by Zippin (1958) to calculate a population estimate where possible. Electrofishing data were compared to counts obtained by snorkel work to test reliability and versatility of techniques.

## **RESULTS AND DISCUSSION**

### **Hatchery Oversight and Documentation**

#### **McCall Hatchery**

A total of 958,300 summer chinook (20.2 per pound) were released in the South Fork of the Salmon River at Knox Bridge on March 30, 1987 (Table 1).

In 1986, 2,690 chinook salmon returned to the trap at the South Fork (Appendix A). This was the best return to the trap to date. The 1981 brood year chinook (released 1983) returned at a rate of nearly one percent (Table 2). Ongoing releases of coded wire-tagged fish are planned for various evaluations.

Table 1. Release data for McCall Hatchery-reared summer chinook salmon (brood year 1985), 1987.

Release site	Release date	Stock	Number	Size (number/pound)	Mark & purpose
Knox Bridge	3/30/87	South Fork	62,100	20.2	LD R3 <sup>a</sup> Water Budget
Knox Bridge	3/30/87	South Fork	103,450	20.2	10/30/21 US - Canada
Knox Bridge	3/30/87	South Fork	104,525	20.2	10/30/20 US - Canada
Knox Bridge	3/30/87	South Fork	103,850	20.2	10/30/19 US - Canada
Knox Bridge	3/30/87	South Fork	<u>584,315</u>	20.2	
Total released			958,240		

<sup>a</sup>Water budget data and timing information to downstream trapping sites can be obtained from Buettner and Nelson (In press).

Table 2. Coded wire tag returns for marked groups of summer chinook salmon returning to the South Fork Salmon River, 1986.

Tag code	Year released	Number tagged released	Number per pound	Purpose	<u>1984 returns</u>		<u>1985 returns</u>		<u>1986 returns</u>		Total returns	Percent
					SF	SR	SF	SR	SF	SR		
10/24/58	1983	62,100	20.3	Hatchery evaluation	126		468		18		612	0.985
10/27/38	1984	50,000	15.8	Hatchery evaluation			117		90		207 <sup>a</sup>	0.414
10/25/18	1985	38,100	19.1	Hatchery evaluation					34		34 <sup>a</sup>	0.089
10/26/33	1985	40,100	19.1	Hatchery evaluation					28		28 <sup>a</sup>	0.069

<sup>a</sup>Additional returns expected in the future.

### **Dworshak National Fish Hatchery**

Dworshak National Fish Hatchery released 1,710,710 spring chinook salmon in 1987 (Table 3). As in previous years, the release into the North Fork of the Clearwater was after dark. The 1986 run of 516 chinook salmon returned to DNFH in 1986 and was the largest to date (Table 4 and Appendix B).

### **Hagerman National Fish Hatchery**

Outplants of steelhead smolts totaled 1,535,351 in 1987 and about 168,832 presmolts were outplanted as excess in 1986 (Table 5).

### **Sawtooth Hatchery**

In 1987, 1,081,400 smolts were released at Sawtooth Hatchery and 195,100 chinook salmon smolts were planted at the East Fork trap (Table 6). Also a fall test release of 103,650 chinook salmon with a LV clip was stocked in the Salmon River at Sawtooth Hatchery in 1986.

In addition, 1,317,750 chinook were reared at Sawtooth Hatchery and released at various sites in the Clearwater River basin (Table 6).

We counted 1,769 salmon at the Sawtooth Hatchery in 1986; returns to the East Fork totaled 194 that year (Table 7). The run at the hatchery was the largest to date (Appendix C).

Returns of coded wire-tagged A-run steelhead to the creel in Hazard Creek were much greater than CWT B-group fish (Table 8).

Returns of CWT groups of chinook (1983 release) were less than 0.2 percent (Table 9). These fish were released at about 29 fish per pound. The 1984 releases were about 17.0 per pound and returns to date are about 0.5 percent, with further returns still expected.

The CWT returns for the larger steelhead smolts (2.1 per pound reared at HNFH and released on the upper Salmon River were three to fourfold better than the smaller (5.3 per pound) smolts (Table 10). This data was consistent (relative to return rates) for two release years. A chi-square test for goodness of fit ( $\chi^2$ ;  $P < 0.05$ ) test to determine if equal poundage of different size fish would have equal returns (larger smolts were 2.5 times greater in weight than smaller smolts) showed expected returns were not significantly different (Zar 1974). Therefore, the larger smolts were not any more efficient from a hatchery production perspective in terms of number of returning adults than smaller smolts.

The large smolts did provide a substantial "catchable" trout fishery (84% of angler harvest) in the upper Salmon River basin from 1983 to 1985 (Partridge 1985). The rate of residualism was greater for the larger smolts (2.1/lb.) compared to the smaller smolts (5.3/lb.). We found residualism rates of 15% to 16% for large smolts, while the smaller size

Table 3. Release data for Dworshak National Fish Hatchery-reared spring chinook salmon (brood year 1985), 1987.

Release site	Release date	Stock	Number	Size (number/pound)	Mark & purpose
North Fork Clearwater	April 2	Rapid River	51,191	17.2	RA R1 <sup>a</sup> Water Budget 10/29/36
North Fork Clearwater	April 2	Rapid River	61,580	17.2	RA R1 <sup>a</sup> Water Budget
North Fork Clearwater	April 2	Rapid River	<u>1,597,939</u>	17.2	
Total released			1,710,710 <sup>a</sup>		

<sup>a</sup>Water budget data and timing information to downstream trapping sites can be obtained from Buettner and Nelson (In press).

Table 4. Returns for spring chinook salmon reared at Dworshak National Fish Hatchery, 1986.

<sup>a</sup>110 coded wire tag returns.

Year	Trapping period	Males		Females	Total
		1-ocean	2- & 3-ocean		
1986	June 1 to September 12	78	214	224	516 <sup>a</sup>

<sup>a</sup>No coded wire tag returns.

Table 5. Release data for Hagerman National Fish Hatchery-reared steelhead trout, 1986-1987.

Release site	Release date	Stock	Number	Size (number/pound)	Mark & purpose
Slate Creek	2/24/87	Steelhead "B"	49,740	4.5	10/29/26 Strain evaluation
East Fork	4/3-6/87	Steelhead "B"	75,642	4.5	10/29/49 Evaluation
Salmon River at Sawtooth Hatchery	4/7-9/87	Steelhead "A"	65,060	4.5	10/29/48 Strain evaluation
Little Salmon River -Hazard Creek	4/21-23/87	Steelhead "A"	65,753	4.6	10/26/25 Strain evaluation
Yankee Fork Salmon River	10/28/86	Steelhead "A"	93,413	27.8	
Boulder Ck Salmon River	10/28/86	Steelhead "A"	27,431	33.2	
Yankee Fork Salmon River	12/9/86	Steelhead "A"	47,988	16.4	
Salmon River Deer Creek Bridge	4/15-22/87	Steelhead "A"	13,801	4.2	
East Fork Salmon River	3/27-4/15/87	Steelhead "B"	409,436	4.5	
Salmon River Sawtooth Hatchery	4/1-15/87	Steelhead "A"	622,574	4.6	
Little Salmon-Hazard Creek	4/16-30/87	Steelhead "A"	233,345	4.6	
Totals	1,535,351 smolts and 168,832 presmolts				
Excess fry outplanted in 1986.					

Table 6. Release data for Sawtooth Hatchery-reared spring chinook salmon smolts, 1986-1987.

<u>Release</u> <u>site</u>	<u>Release</u> <u>date</u>	<u>Number</u>	<u>Size</u> (number/ pound)	<u>Mark &amp;</u> <u>purpose</u>
Salmon River Drainage				
Salmon River	10/10/86	103,650	26.3	LV Clip - Fall Release
Sawtooth	3/13/87	100,450	22.9	10/30/16 -US - Canada
"	3/13/87	101,175	22.9	10/30/17 -US - Canada
	3/13/87	101,850	22.9	10/30/18 -US - Canada
				Includes 62,125 ROR
				for Water Budget
	3/13/87	777,925	22.9	Unmarked
East Fork	3/19/87	19,625	22.9	10/29/63 - Evaluation
Salmon River	3/19/87	30,575	22.9	10/29/21 - Evaluation
	3/19/87	144,900	22.9	
Clearwater River Drainage				
White Sands	10/14/86	29,500	28.0	10/29/58 - Evaluation
Creek	10/14/86	20,925	28.0	10/29/59 - Evaluation
	10/14/86	297,925	20.0	
	3/18/87	39,700	24.4	10/29/56 - Evaluation
	3/18/87	9,625	24.4	10/29/61 - Evaluation
	3/18/87	295,575	24.4	
Crooked River	10/12/86	251,300	30.6	
	3/17/87	227,500	25.0	
	10/8/86	49,475	26.3	10/29/51 - Evaluation
	10/8/86	46,925	26.3	
	3/18/87	30,100	24.4	10/29/57 - Evaluation
	3/18/87	19,200	24.4	10/29/02 - Evaluation

Table 7. Adult return summary for anadromous fish released at Sawtooth Hatchery, 1986-1987.

Species	Recapture location	Males	Females	Total	Released upstream	
					Males	Females
Spring chinook <sup>a</sup>	Sawtooth Hatchery	1,043	726	1,769	628	248
Spring chinook <sup>a</sup>	East Fork Trap	115	79	194	101	25
Steelhead <sup>b</sup>	Sawtooth Hatchery	1,174	1,113	2,287	596	383
Steelhead <sup>b</sup>	East Fork Trap	88	136	224	49	62

<sup>a</sup>Returns to location for 1986.

<sup>b</sup>Returns to location for 1987.

Table 8. Summary of coded wire tag returns for East Fork Salmon River trap and Little Salmon River at Hazard Creek releases.

Species	Tag code	Marks released	Size at release (#/lb.)	Date released	Release site	Returns					Total	Percent return
						Purpose	Fall-spring harvest 85-86	Release site 86	Fall-spring harvest 86-87	Release site '87		
Steelhead "A"	5/13/36	96,425	2.6	4/19/84-4/26/84	Little Salmon Hazard Creek	Strain evaluation	501	a	96	— <sup>a</sup>	597	0.619
Steelhead "B"	10/28/6	56,906	4.3	4/19/84-4/26/84	Little Salmon	Strain	3	— <sup>a</sup>	84	— <sup>a</sup>	87	0.090
	10/28/7	95,624 38,718			Hazard Creek	evaluation						
Steelhead "B"	10/25/55	17,425	5.0	3/26/85	East Fork	Early Release "Time of Release"			0	0	0 <sup>b</sup>	0
Steelhead "B"	10/26/31	39,375	4.6	4/10/85	East Fork	Control "Pro Poly aqua" Transport			47	10	57 <sup>b</sup>	0.145
Steelhead "B"	10/26/36	35,225	4.8	4/10/85	East Fork	"Pro Poly aqua" Transport Concentration +26.4 ppm			11	5	16 <sup>b</sup>	0.045
Steelhead "B"	10/28/03	16,950	4.9	4/10/85	East Fork	Mid-Release "Time of Release"			0		0 <sup>b</sup>	0
	10/28/02	8,100	4.4	4/10/85	East Fork	Mid-Release "Time of Release"			3	0	3 <sup>b</sup>	0.037
Steelhead "A"	10/26/32	39,175	4.3	4/25/85	Little Salmon-Hazard Creek	Strain Evaluation			66		66 <sup>b</sup>	0.168
Steelhead "B"	10/28/54	25,525	4.3	4/29/85	East Fork	Late Release "Time of Release"			13	3	16 <sup>b</sup>	0.063

<sup>a</sup>Return to release site cannot be determined due to lack of trapping facilities.<sup>b</sup>Additional returns expected in the future.

Table 9. Summary of coded wire tag returns for Sawtooth Hatchery and East Fork trap area releases.

Species	Tag code	Marks released	Size at release (#/lb.)	Date release	Release site	Purpose	Returns								
							Release site 84	Release site 85	Fall-spring harvest 85-86	Fall-spring 'Release' site 86	Fall-spring 'Release' harvest 86-87	'Release' site 87	Total	Percent return	
Spring Chinook	10/24/08	35,075	28.7	3/29/83	Salmon R. above Sawtooth	Hatchery Evaluation	2	50			15			67	0.191
Spring Chinook	10/25/35	51,450	28.7	3/29/83	Salmon R. above Sawtooth	Hatchery Evaluation	2	68			9			79	0.153
Spring Chinook	10/27/08	51,025	17.0	3/27/84	same as above	Hatchery Evaluation		83			219			302	0.591
Spring Chinook	10/27/09	50,600	17.0	3/27/84	same as above	Hatchery Evaluation		71			183			254	0.502
Spring Chinook	10/26/34	41,200	22.5	3/25-29/85	same as above	Hatchery Evaluation					0			0	0 <sup>a</sup>
Spring Chinook	10/26/35	38,150	22.5	3/25-29/85	same as above	Hatchery Evaluation					2			2	0.005
Steelhead "B"	10/24/60	37,600	3.6	4/12-13/83	East Fk. Salmon R.	Stock Evaluation		3	27		8	0	0	38	0.010
Steelhead "A"	10/26/30	40,475	4.5	4/9/85	Sawtooth Hatchery	Hatchery Evaluation						189	52	241	0.595

<sup>a</sup>Additional returns expected in the future.

Table 10. Summary of "size at release" test groups released from Hagerman National Fish Hatchery, 1984-1985.

Tag	Species	Marks code	Size at release (#/lb.)	Date released	Site released	Purpose	Returns				Total %
							84-85 harvest	Release site	85-86 harvest	Release site '86	
Steelhead "A"	15/13/33	40,57 3	2.1	4/18-20/83	Salmon River above Sawtooth	Size at Release $\bar{x}$ -10.2"	26	17	40	2(3) <sup>a</sup>	88 <sup>b</sup> (0.21)
Steelhead "A"	15/13/34	40,548	5.3	4/18-20/83 above $\bar{x}$ -8.2"	Same as above	Size at Release	7	2	12	1	22 (0.05)

Returns					Total 0
85-86 harvest	Release site	86-87 harvest	Release site '87		
Steelhead "A"	5/10/29	40,322	2.1	4/24-26/84 Salmon River above Sawtooth	318 <sup>b</sup> (0.8)
Steelhead "A"	5/10/28	39,763	5.3	4/24-26/84 Same as above	111 (0.3)

~~<sup>a</sup>Estimated three-ocean steelhead "A" harvested in lower Clearwater.~~

<sup>b</sup>Not significantly better return ratio (2.5:1) for chi-square goodness of fit ( $\chi^2$ ;  $P < 0.05$ ).

fish residualized at 11 to 2%. This data suggests the release of larger smolts in the upper Salmon River has the added benefit of a resident trout fishery. However, Dave Bruhn (personal communication), Hatchery Manager of HNFH, suggests that a more realistic target size for large smolts would be 3/lb. Before a program using larger steelhead smolts was to be implemented, problems with the interaction of steelhead on smaller chinook smolts during transportation should be examined.

## Research and Evaluation

### **Adult Steelhead Redd Counts and Trapping**

Allison Creek was the site of steelhead trout B-group releases in 1983 and 1984. No adults or redds were noted during any of these observation dates: March 17 and 31, April 20 and 28, May 8 and 15, and June 18, 1987. Only two redds were noted in 1986. Allison Creek has little spawning gravel, a barrier to upstream migration, and is generally a poor planting site, even for "staging" steelhead. Other tributaries in the area would be better outplant sites, including French Creek, Partridge Creek and Lake Creek. We are compiling a list of objective physical characteristics of streams that can be used by management to evaluate stocking sites to better prioritize basinwide stocking requests. Characteristics include: quality and amount of spawning gravel, presence or absence of migration barriers, stream gradient, and condition of riparian zone. This list of characteristics will be expanded as other parameters are found from literature searches or research. The literature indicates that for gradients over four percent, juvenile chinook salmon rearing dramatically declines. With an increase of stream gradient over two percent, Idaho juvenile chinook salmon densities declined (Charlie Petrosky, IDFG, personal communication). There was no rearing above 10 percent. Other characteristics that we will evaluate in the future for target streams will be: pool-riffle structure, pool quality, habitat diversity, and sedimentation.

A weir was placed in White Bird Creek on March 5, 1987 and removed on March 6 due to high water. Because of the runoff pattern, no further attempt was made to weir White Bird Creek. With heavier trap material, it is possible that White Bird Creek could be weired at least long enough to determine the composition and potential magnitude of the run. White Bird Creek could be the site of a substantial wild run of A-group steelhead.

A total of 20 adult steelhead were trapped in 1987. The A-group outnumbered the B-group returns by 14 to 6 (as calculated by length frequencies). Slate Creek was the site of B-strain releases in 1983 and 1984. We would have expected that hatchery returnees would be B-group fish. It is possible that up to 15% of the A-group fish were actually B-steelhead due to the overlap when length-frequency data are used to determine whether the fish are "A" or "B" fish. All of the fish trapped at Slate Creek were of hatchery origin except for the three wild steelhead. Trap efficiency was relatively poor, and no efficiency rates were calculated because no marked steelhead were trapped in the downstream box. The reason for the low return of B-group steelhead is unclear.

Slate Creek has considerable spawning and rearing habitat for anadromous species. The proposed release of chinook salmon (in the Idaho Anadromous Fisheries Management Plan) should be made here as fish become available. Slate Creek could also provide some additional chinook salmon fishing. However, no fishing for chinook salmon should occur in the Main Salmon River because of the risk of harvesting wild fish destined for the Middle Fork of the Salmon River.

### **Juvenile Salmonid Densities**

Juvenile rainbow-steelhead trout densities were generally comparable between years for the Slate Creek and White Bird Creek individual sites (Tables 11 and 12). White Bird Creek had higher densities of rainbow-steelhead trout juveniles. Very few juvenile chinook were counted in the transects. Further work needs to be conducted to find a technique to differentiate between steelhead trout and rainbow trout juveniles to allow more accurate assessment of steelhead production. The juvenile rainbow-steelhead densities for Slate Creek and White Bird Creek were within the ranges that Petrosky and Holubetz (1985) found for Boulder Creek and the Little Salmon River.

Insufficient numbers of juvenile rainbow-steelhead were captured by electrofishing to calculate a realistic population estimate in Section 3 of Slate Creek. We estimated a population of 11 juveniles for the transect length compared to 36 counted by snorkeling. Specific conductivity was 52 micromhos/cm, but we were effective in shocking fish. The swift current prevented netting enough fish by electrofishing to allow an accurate population estimate.

The population estimate by electrofishing in Section 5 of Slate Creek was 54 juvenile salmonids, with 95% confidence intervals of 51 to 57. The snorkel count for the section was 63 fish. The conductivity was 72 micromhos/cm.

A population estimate by electrofishing in Section 1 of White Bird Creek could not be made because the number of fish captured on the first run was less than the second run. The conductivity was 136 micromhos/cm.

The population estimate for Section 4 of White Bird Creek was 73 juvenile salmonids + 3 fish. We counted 71 fish while snorkeling showing no significant difference between the techniques. The conductivity at this site was 37 micromhos/cm.

Generally, snorkeling was a better technique for counting juvenile salmonids over the range of stream conditions we worked and should be continued to be used for trend estimates.

Table 11. Juvenile salmonid density by snorkeling (number/100 m<sup>2</sup>)  
data for Slate Creek, 1985-1986.

Section	Yea	Rainbow-steelhead					Chinook		
		Age 0 <sup>a</sup>	Age I	Age II	Age >III	Totals	Age 0	Age 1	Adult
1	1985	P	0.8	3.1	0.7	4.6	0	0	0
	1986	A	4.2	3.0	1.0	8.2	1.2	0	0
2	1985	P	3.0	1.0	0.6	4.6	0.3	0	1
	1986	A	4.5	2.1	0	6.6	0.2	0	0
3	1985	P	2.7	2.3	0.1	5.1	0	0	0
	1986	A	3.6	0.6	1.0	5.2	0	0	0
4	1985	P	2.4	1.7	0.3	4.4	0	0	1
	1986	P	3.8	1.6	0.7	6.1	0	0	0
5	1985	P	34.	11.1	0	45.6	0	0	0
	1986	P	14.	6.6	0	20.7	0	0	0

<sup>a</sup>P = Present; A = Absent

Table 12. Juvenile salmonid density by snorkeling (number/100 m<sup>2</sup>)  
data for White Bird Creek, 1985-1986.

Section	Year	Rainbow-steelhead				Chinook			
		Age 0 <sup>a</sup>	Age I	Age II	Age >III	Totals	Age 0	Age 1	Adult
1	1985 <sup>a</sup>	--	--	--	--	--	--	--	--
	1986	P <sup>b</sup>	16.7	7.1	1.5	25.3	1.2	0	0
2 <sup>c</sup>	1985	P	19.1	0.4	0	19.5	0	0	0
	1986	P	26.9	2.1	0.2	29.2	0	0	0
3 <sup>c</sup>	1985	P	17.6	9.8	1.1	28.5	0	0	0
	1986	P	28.2	3.2	0.2	31.6	0	0	0
4 <sup>c</sup>	1985	P	11.2	7.8	0.4	19.4	0	0	0
	1986	P	6.3	0.9	0	7.2	0	0	0

<sup>a</sup>Not established in 1985.

<sup>b</sup>P = Present

<sup>c</sup>Sections 2, 3, 4 in 1987 were listed as sections 1, 2, 3, respectively, in the 1986 LSRCP Annual Report.

## ACKNOWLEDGEMENTS

I would like to thank the following people and their staffs for their cooperation, assistance, and for the information that they provided:

Wayne Olson and Bill Miller - Dworshak National Fish Hatchery and FAO;  
Dave Bruhn - Hagerman National Fish Hatchery;  
Tom Frew - McCall Fish Hatchery;  
Tom Rogers - Sawtooth Fish Hatchery;  
Kent Ball - provided harvest estimates;  
Tim Cochnauer - anadromous fish marking and recovery; and  
Bill Hutchinson and Tom McArthur - provided adult return and stocking data for LSRCP facilities.

Additional information on the work being done at the separate facilities and projects can be obtained directly from these individuals or their annual reports.

Field work was performed by Gary Partridge and William Sharp.

## LITERATURE CITED

- Buettner, E.W., and V.L. Nelson. 1988. Smolt condition and time of arrival at Lower Granite Reservoir. Annual report 1986, BPA Contract Number DE-A179-83BP11631, Project Number 83-323B. Idaho Department of Fish and Game, Boise, Idaho.
- Petrosky, C.E., and T.B. Holubetz. 1985. Idaho habitat evaluation for offsite mitigation record. Annual report 1983, BPA Contract Number DE-A179-84BP13381, Project Number 83-7. Idaho Department of Fish and Game, Boise, Idaho.
- Partridge, F.E. 1984. Fish hatchery evaluations - Idaho. Fish and Wildlife Service Contract 14-16-0001-832687. Idaho Department of Fish and Game. Boise, Idaho.
- Partridge, F.E. 1985. Effect of steelhead trout smolt size on residualism and adult return rates. Fish and Wildlife Service Contract 14-16-001-83065. Idaho Department of Fish and Game. Boise, Idaho.
- Rohrer, R.L., and F.E. Partridge. 1985. Fish hatchery evaluations - Idaho. Fish and Wildlife Service Contracts 14-16-000-83268 and 14-16-0001-84098. Idaho Department of Fish and Game. Boise, Idaho.
- Rohrer, R.L., and J.A. Davis, 1986. Fish hatchery evaluations - Idaho. Fish and Wildlife Service Contract 14-16-0001-85059. Idaho Department of Fish and Game. Boise, Idaho.
- Welsh, T.L., S.V. Gebhards, H.E. Metcker, and R.V. Corning. 1965. Inventory of Idaho streams containing anadromous fish including recommendations for improving production of salmon and steelhead. Fish and Wildlife Service Contract 14-19-001-433. Idaho Department of Fish and Game. Boise, Idaho.
- Zar, J.H. 1974. Biostatistical analysis. Prentice-Hall, Inc. Englewood Cliffs, New Jersey.
- Zippin, C.. 1958. The removal method of population estimation. Journal of Wildlife Management 22(1):82-90.

## **APPENDICES**

Appendix A. Trapping summary of adult summer chinook salmon on the South Fork Salmon River.

Year	Weir installed	Weir removed	Males		Females	Total	Released upstream	
			1-ocean	2- & 3-ocean			Males	Females
1980	July 19	September 10	186	148 (80) <sup>a</sup>	46 (161) <sup>a</sup>	380 (241) <sup>a</sup>	209	21
1981	July 8	September 14	124	206	194	524	167	60
1982	July 20	September 7	48	306	196	550	112	45
1983	July 12	September 4	505	192	240	937	161	55
1984	July 9	September 5	595	431	503	1,529	213	124
1985	June 19	September 10	828	514	895	2,237	373	400
1986	June 27	September 9	1,222	757	711	2,690	257	212

<sup>a</sup>Summer chinook salmon trapped at Lower Granite Dam and held at Dworshak National Fish Hatchery.

Appendix B. Trapping summary of spring chinook on the Clearwater  
River at Dworshak National Fish Hatchery.

Year	Trap operated	Trap removed	Males		Females	Total
			1- ocean	2- & 3- ocean		
1984	June 1	September 10	14			14
1985	June 1	September 10	13	150 <sup>b</sup>	171 <sup>b</sup>	334
1986	June 1	September 12	78	214	224	516

<sup>a</sup>First release under LSRCF occurred in 1983.

<sup>b</sup>Estimates from fish actually spawned; not all fish counted were spawned.

Appendix C. Trapping summary of spring chinook salmon on the Salmon River at Sawtooth Hatchery.

Year	Weir installed	Weir removed	Males		Females.	Total	Released upstream	
			1-ocean	2- & 3-ocean			Males	Females
1981	June 25	September 9	23	257	449	729		255
1982	June 29	September 26	16	135	111	262	--	12
1983	July 19	September 6	17	170	179	366	78	19
1984	July 7	September 6	76	142	187	405	140	65
1985	June 14	September 25	296	786	557	1,639	445	180
1986	June 20	September 9	51	992	726	1,769	628	248

Appendix D. Proposed production and distribution summary of Idaho's LSRCP anadromous fish hatcheries' smolt production.

Hatchery	Species	Water planted	Number	Total production
McCall	Summer Ck	SF Salmon	1,000,000	1,000,000
	Summer Ck	Johnson Creek	100,000 <sup>a</sup>	
Sawtooth	Spring Ck	Upper Salmon River	1,300,000	2,300,000
		EF Salmon River	700,000	
		Valley Creek	100,000	
		Yankee Fork	200,000	
		Slate Creek	100,000 <sup>a</sup>	
Dworshak	Spring Ck	NF Clearwater	500,000+	
		Crooked River	200,000	
		Newsome Creek	100,000 <sup>a</sup>	
Hagerman	Steelhead "B"	Slate Ck up to	500,000	
	Steelhead "B"	EF Salmon up to	1,000,000	
	Steelhead "B"	Boulder Creek	100,000	
	Steelhead "A"	Upper Salmon	700,000	
	Steelhead "A"	Hazard Creek, French Creek, Lake Lake Creek, others	500,000+ up to 1,000,000	

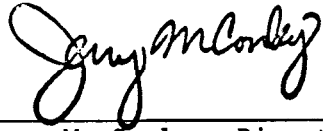
<sup>a</sup>If surplus available.

Submitted by:

Robert L. Rohrer  
Senior Fishery Research Biologist


Approved by:

IDAHO DEPARTMENT OF FISH & GAME



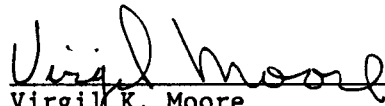
---

Jerry M. Conley, Director



---

David L. Hanson, Chief  
Bureau of Fisheries



---

Virgil K. Moore  
Fishery Research Manager